· THE · CANADIAN · ARCHITECT · AND · BVILDER ·

VOL XX.—No. 4. Toronto, Montreal——APRIL, 1907——Winnipeg, Vancouver PRICE 15 CENTS $1.00 PER YEAR

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NOTES.

Ottawa has been chosen as the headquarters of another industry. Messrs. Chisholm & Birkett, of Kingston, have about completed arrangements to begin an extensive brickmaking plant at Washburn, on the Rideau. The company will employ a large number of men with headquarters at Ottawa.

George W. Dunlap, of the Perfection Cement Block Company of Vancouuer, has received during the past week, through the agency of Rowland Britain, patent attorney, Vancouver, a Canadian patent on an improved face plate for a cement block mould. This invention is designed to provide a means whereby a variety of facings may be applied to a single face plate, and which also enables the parting blades, whereby sectional lengths of block are divided, to be more securely fastened. The improvement is in regular use in the Perfection Cement Block Company's plant, and has given unqualified satisfaction.

As a result of a cut in prices by the American Window Glass Company, every window glass factory in the country, with the possible exception of one non-union plant at Lancaster, Ohio, will close April 25. The National Brokerage Company, representing the output of 90 per cent. of the hand-blower plants, refused to meet the cut in prices.

British Trade Supplement

The Publishers of **"The Canadian Architect and Builder"** have arranged to furnish information respecting British Exporters of Building Materials and their goods advertised in this paper, and will keep on file at their offices, Board of Trade Building, Montreal, Confederation Life Building, Toronto, and 720-721 Union Bank Building, Winnipeg, **Catalogues, Price Lists, Etc.**

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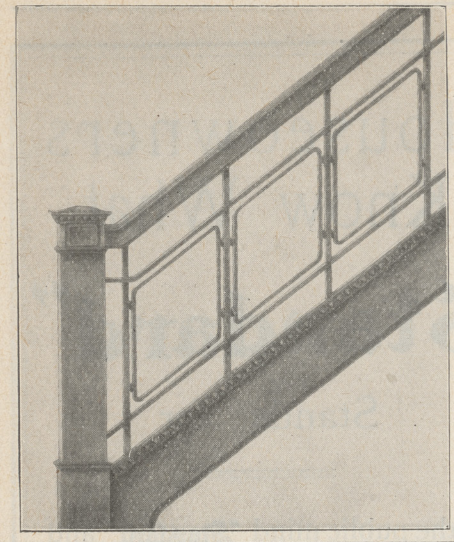

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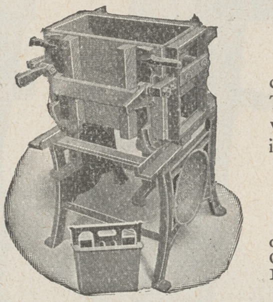

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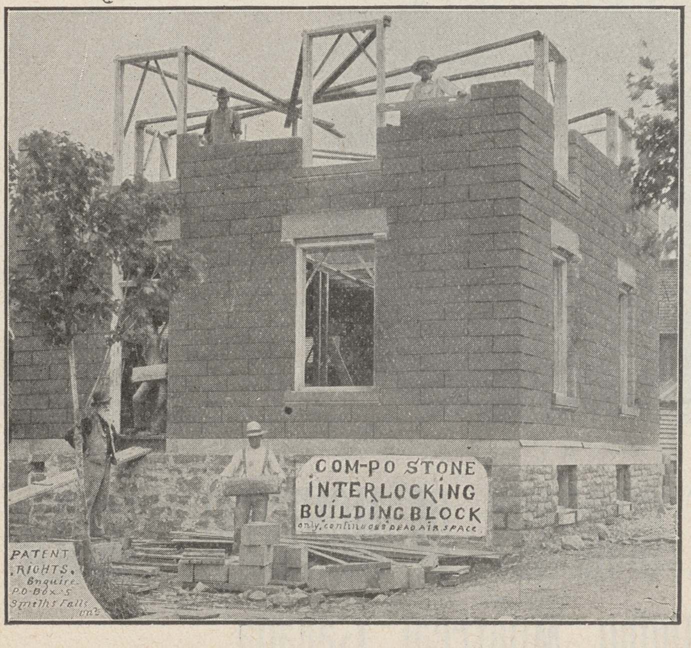

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HEIGHT OF BUILDINGS REGULATED.

The Montreal South Council has passed a by-law prohibiting the erection of any building the main portion of which is less than one and one half stories. Plans for all buildings must be submitted to the council before work is started. A permit must also be obtained before any alterations on present buildings can be gone on with. Roofs in future must be made of some fireproof material. No building can be erected nearer the street line on the main streets than ten feet and on the side streets less than six feet. A clause was also inserted making a penalty for non-compliance with the law.

NOTES.

In Maine, in British Columbia and in Ontario efforts are being made to produce turpintine from pine stumps, but so far results do not seem to be satisfactory.

At Frank, Alberta, a large cement plant is shortly to be erected by the Rocky Mountain Cement Company, capital $600,000. The daily output will be from 600 to 1,000 barrels per day. About 125 men will be employed.

What will probably be the largest brick making plant on Vancouver Island will shortly be begun near Victoria, B. C., by Messrs. Humber Bros. The daily output of brick will be 75,000. In the same city a plant for manufacturing cement blocks is also being erected by a joint stock company composed of Victoria citizens.

The Canadian Architect and Builder

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VOL XX.—NO. 232. APRIL, 1907.

ILLUSTRATIONS.

CANADIAN ARCHITECT AND BUILDER Competition for a Small Surburban Town House.—Design submitted by "Westward Ho."

ADDITIONAL ILLUSTRATIONS IN ARCHITECTS' EDITION.

House near Birmingham, England.—Mr. E. Stanley Mitton, Architect.
"Dalkeith Lodge," Residence of Mr. Henry New, Hamilton, Ont.—Henry H. New, Architect.

CONTENTS

Advisory Council of Art.

At the opening of the Royal Canadian Academy's exhibition in Montreal on April 1st, it was announced in a telegram from the Hon. Sydney Fisher that the Government had seen its way clear to arrange for the establishment of an Advisory Council of Art, on whose advice the Minister of Public Works, on behalf of the Government, will make an expenditure for Art purposes. It is understood that this is to be a permanent Commission. The president of the R. C. A., Mr. George A. Reid, intimated that some of the duties of this Council would be the supervision of the national collection of art, the decorating of public buildings, the erection of public monuments, and the purchase of works of art by the Government. A good deal of the daily press comment on the matter seems to take for granted that art consists principally in picture painting. It is, therefore, satisfactory to see that the president of the Academy has a broader idea of its sphere, and that architecture, the mother and guardian of all the arts, is to receive attention. Moreover, it is to be hoped that the Commission may give encouragement to an even wider field than would at first appear in the above statement. The higher arts, those that appeal to the more delicate senses, to the finer emotions, and to the subtler qualities of intellect, will live only an artificial kind of life in our country, unless the commoner, everyday technical and useful arts, which our people practice in earning their daily bread, are to grow roots of their own in the intelligence of our own workers. The delight of the workman in his work is the beginning of all art. The delight to the senses, to the mind, and to the spirit, that work well done conveys, is the end of all art. Old countries, with their galleries stored with the works of centuries past, and their streets lined with great histories written in stone, make our new-world cities look barren and vacuous in comparison. The material needs of the body we can supply abundantly, but at present we have to depend for elevating and refining influences on art in the form of literature, in which form it can be most readily brought to our doors. This is good in its way, but cannot permeate our daily life, and, in consequence, our daily manners, tempering them in that thorough way that can be attained by the continual striving to do well and beautifully whatsoever our hands find to do—to fill full the work of our hands with the intelligence that technique well mastered and purpose well conceived, realized and accomplished, can express. In order that the work produced in our country may achieve something of this satisfying quality, it is necessary that our workers in all crafts have the opportunity of education in their callings, such as will give them an idea of the size of the field in which they labor and the possibilities of the material in their hands and of the processes they employ. A good groundwork in drawing and modeling, and in the scientific elements of their subjects, is the a b c. They must have facilities to acquire in order to study further. How directly the finer arts are the flower upon the plant of the technical arts was well illustrated in the great renaissance, when so many of the world's great masters were recruited from the goldsmith's workshops of Italy. A great national collection of pictures would be a benefit and an honor to the country, but a number of collections of works of the lesser arts in different centres, whilst it would probably be much less costly, would in our present stage of cultivation be a great service to a greater number, and would be a stepping stone to the appreciation and production of the works that embody

higher qualities. We hope the Council will keep in mind Wm. Morris' ideal of art as being made "by the people, for the people, a joy to the maker and the user."

The Fire at McGill University.

On the 5th of April, the MacDonald Engineering Building of McGill University, Montreal, was almost entirely destroyed by fire. The building, which was designed by Mr. A. T. Taylor, F.R.I.B.A., of Montreal, was solidly built of limestone externally, and of mill-construction internally. The Workman Memorial, forming a wing of the same suite of buildings, was shut off by fire doors and was entirely saved. The Architectural Department, which was accommodated in the main building, was destroyed. The buildings and equipment were only moderately insured, and the loss to the University must be heavy indeed, as the equipment in many cases represented years of thought and labor on the part of the staff. It is stated that, owing to the fact :hat there was no vault in the building, a large accumulation of data, the results of tests and experiments made during many years, have been lost. The University had just been making a special appeal to the public, with a view to raising the sum of a million dollars to form a general endowment fund, on the ground that it was not in possession of the means necessary for carrying on its work. The fire, therefore, comes as a heavy blow, and, when the members of the faculties assure their students that everything will go on next session as before, they must be understood to be speaking with the courage of hope. It would indeed be a disgrace to Canada if that hope were to be disappointed. At the same time, a very considerable sum of money must somehow be raised if the progress of the Faculty of Applied Science is not to suffer a setback. The building just destroyed was already becoming too small for the ever-increasing numbers of students. The sum recoverable on insurance will go some way towards reinstating what was there before, but it will take much more than this to enable the University to cope with the ever increasing demand for scientific training.

Labor in Politics.

Amid a flourish of trumpets Labor has organized itself into a party, and has entered the arena of Provincial politics. On Good Friday, 600 labor men assembled in Toronto from all the industrial centres of the Province of Ontario, with the avowed purpose of organizing an Independent Labor Party, wherein might be consolidated the unorganized strength and influence of the working classes, that these might be utilized at election times for the benefit of the wage earners, and that friends of organized labor might find seats in the Legislatures and in the various Municipal Councils. By such an ambitious movement is it intended in the future to guard the interests of Labor.

There can be no mistaking the earnestness, honesty and determination of the representatives present at the convention. That 600 men could be brought together for such a purpose is significant. That the conduct of some of those present should appear rather ludicrous, and the language at times unparliamentary, is perhaps less to be wondered at. Excitement never departed from the discussions. In fact, the two sessions of the convention were mostly discussion, and, had it not been for President Rollo's continual pounding on the table with a heavy pine slab, discussion might have grown into discord. Over the question as to the position to be assigned to Socialism in the new Labor Party, much bitterness was apparent. Nevertheless, by an overwhelming majority of 500 votes to 34, the entire Socialistic platform, which was proposed as the basis for the Labor party, was voted down, and that of the Dominion Trades and Labor Congress adopted. This seems to portend a lack of co-operation in the future between trade unionism and Socialism.

What the future history of this new party will be it is difficult to say. Labor has met together, talked over its policy and apparently intends to try to carry out that policy. The chief incentive to this movement seems to be, to quote their own language, the impression that "the presence in the Legislature and in Parliament of a number of representatives of the people, not attached to either of the old parties, would operate advantageously to the public interest by assuring consideration of public measures on their merits alone, without regard for party gain or loss."

In view of this statement, Mr. Allan Studholme, the Labor representative from Hamilton, becomes an interesting personality. His future conduct in the Legislature will be studied, as affording a possible hint of what may be expected of the party he represents. His view of Mr. Whitney's policy to grant himself and his Cabinet an increase in salary is a case in point. Mr. Studholme is reported to have declared himself opposed to any such movement. Labor views the work in the Legislature very much as a business proposition, and considers Mr. Whitney and his Ministers as mere servants of the people, doing a certain work for a certain wage. Moreover, Mr. Studholme's position may be taken as a type of what will obtain in the case of future Labor representatives. Mr. Studholme's views seem to be prettly largely those of the class he represents, and little originality in legislation may be looked for from him. Labor representatives, it is to be feared, will merely voice the sentiments of labor.

Here, then, is the question. Can labor be relied upon to treat with sufficient magnanimity great public questions? There is a danger that the new party may be characterized by a selfishness which not only will endanger the welfare of the public generally but of the employer of labor and of the manufacturers particularly. From its past history, the future conduct of Labor must be inferred, and it may not be too early to warn the employer and manufacturer to be alert and watchful of the new party, and even adopt measures to meet it in the political arena with an organization no less enthusiastic. The time appears to have come when employers must organize themselves as their employes are trying to do, not only from purely personal and self-protective motives, but also for the good of the country at large. The employer must not overlook the fact that Labor is becoming accustomed to obtaining what it asks for, and he may find it to his interest in the not far distant future to have in the Legislatures representatives who will be prepared and willing to voice his wishes and see that he has justice done him.

RECENT AMENDMENTS TO THE TORONTO BUILDING BY-LAW.

Any attempt to put a stop to the appalling losses of life and property from fires breaking out in the congested districts of our great modern cities is undoubtedly a most commendable project, and apparently Toronto's lesson of three years ago has not been forgotten in the newly amended by-law, regulating the erection and providing for the safety of buildings. Differences of opinion very naturally may arise regarding the requirements for reinforcing concrete or concerning the relative strengths of materials, but in these respects expert opinion seems fairly agreed that the instructions and formulæ in the new by-law can be relied upon. In one respect, however, it seems to be the general impression that the by-law as it stands will bear still further alteration. We refer particularly to the third section of article four, in which reference is made to the powers vested in the Inspector of Buildings with regard to the granting of permits, and which reads as follows: "When such applications, drawings and specifications conform to this by-law, the said Inspector of Buildings shall certify and approve of the same, and the permit therefor shall be issued by him. Provided that the said Inspector, who is hereby appointed for this purpose, may permit such deviation from the by-laws regulating the erection of building, as in his opinion will afford proper and safe construction under the circumstances."

It is this latter clause of the article to which exception has been taken. How essential it is to have a law which can be properly interpreted, both by architects in preparing their plans, and by the City Architect, who uses it as his test in guarding the safety of the public, needs no discussion here. Nevertheless, in this article of the by-law we have practically no limit set to the discretionary powers which the City Architect may in certain cases exercise. In the case of the erection of new buildings, no serious departure will be allowed from the text of the by-law, but it is difficult to imagine within what limits the phrase "deviation from the by-law" may be defined. Much may depend upon the personal relations existing between the City Architect and the particular architect submitting plans, and a fruitful field is opened for personal differences and errors in judgment. It has been contended by the framers of the by-law that they found it impossible to cover all possible cases that might arise in connection with the granting of permits, without giving to the Inspector of Buildings wide discretionary powers.

While admitting the validity of this statement, the combined committee, appointed by the Architects, Engineers, the Board of Trade, the Manufacturers' Association and the Builders' Exchange of the city, nevertheless, made a recommendation, based upon the building code, compiled by the National Board of Fire Underwriters, of New York. This recommendation was to the effect that the City Architect should have power to vary or modify any of the provisions of this by-law or any rule or regulation of the Department of Buildings, relating to the construction, alteration or removal of any building or structure erected or to be erected within the City of Toronto. . . where there are practical difficulties in the way of carrying out the strict letter of this by-law, so that the spirit of this by-law shall be observed and public safety secured and substantial justice done; but no such variation or modification shall be granted or allowed unless the particulars of each application and of the decision of the Commissioner thereon, shall be entered upon the records of the Department, and opportunity shall have been given adjoining property owners to enter protest." Furthermore, the recommendation provides for an opportunity of appeal against a refusal of permit by the City Architect to a Board of Arbitration, consisting of two civil engineers and an architect, who should have no interest in the question at issue. This recommendation was, however, rejected in toto by the framers of the by-law.

Instances have recently been pointed out where in times past mistakes have been made in Toronto building construction which would have been rendered impossible had there been in existence such a Board of Arbitration as has been recommended, and yet today these buildings remain in our congested districts, a standing menace to public safety.

The present by-law (page 54, article 53) says that "public halls in which the seating capacity exceeds 1,000 must be of fireproof construction throughout, except the wood floor boards and the sleepers to which they are fastened." On page 12, article 16, we also read: "All buildings erected or altered so as to exceed seventy feet in height shall be of fireproof construction." In this latter article no exception whatever is made as to floors. Obviously, some difficulty might be excusable in the manner of reconciling the interpretation of these two rather contradictory articles, and it is not right to give our City Architect such broad discretionary powers as will enable him to veto the by-law, and, however unwittingly, create conditions that might prove hazardous to an entire neighborhood.

That too much attention cannot be given to this question of fireproof building construction is evidenced by the strenuous efforts being made by the National Board of Fire Underwriters of New York to have adequate building laws enacted in towns and cities throughout the United States; and in Canada, with our rapidly enlarging city populations, we may well profit by the principles they are advocating.

The aggregate fire loss in the United States for the years 1901 to 1905, inclusive, was $866,617,705, an average yearly loss of nearly $175,000,000, or over $2 per capita. Contrasted with this, the European fire loss is only 33 cents per capita. Enquiry as to the cause of the difference elicits the information that in all European cities great losses are impossible, because stone and brick buildings are insisted on. From Vienna comes a report, saying that no case is on record in that city where a conflagration has extended beyond the building in which it originated, and, moreover, scarcely any cases are known where a fire extended beyond the floor on which it started. Similar conditions prevail also in other great European cities. The United States is waking up to the fact that there is nothing in which American municipal governments make so unfavorable a showing in comparison with those of European cities as in all that relates to construction of buildings and the enforcement of regulations which minimize the danger of losses of life and property by fire.

That the new by-law goes far to protect Toronto against a repetition of the disaster of 1904 must be readily admitted. Also in some minor particulars the small builder is saved some unnecessary outlay, as in the building of chimneys on brackets, if there is not more than 12 feet of brickwork. Again, the old by-law called for a staggered wall between each pair of houses that were built together, whereas the new considers the ordinary partition sufficient, and thus cuts the cost in two. In the provisions for shingle roofs, there will also be a lessening in cost. Formerly two plies of 10-pound asbestos had to be placed under the shingles, now a single ply of 14-pound is all that is required. This applies also where the upper walls are covered with shingles, as in small houses or summer homes.

The dimensions laid down for cast iron columns are said by some local experts to be scarcely large enough, the recommendations having been based upon obsolete formulæ. On the other hand, the requirements for steel seem to be placed too low, the New York code specifying a maximum stress of 14,620 pounds per square inch, instead of 12,000, as stated in the by-law. The requirements for wooden columns are also said to be too low, the New York code specifying a stress of two or three times as great for columns of

similar size. If this is so it means a waste of money for builders of large structures. However, in buildings where wooden columns are used, it is a question whether it may not be ultimate economy to use the larger sizes, as in case of their partial destruction by fire they may still support the superstructure.

Considerable care has been taken to ensure the public safety where elevators, hoists, stairs and fire escapes are concerned.

The requirements for reinforced concrete are very explicitly given, but naturally much difference of opinion is expressed as to the correctness of the specifications made. The formula is: "One part cement, two parts of sand, and four parts of clear stone or gravel. This mixture, after standing for 28 days, will have a resistance of 2,000 pounds to the square inch. Nothing but high grade Portland cement must be used, and it must develop a tensile strength of 600 pounds per square inch. The crushed stone must be small enough to pass through a three-quarter inch ring, and sand must be clean and coarse. These ingredients, blended according to the formula given, should produce the best kind of concrete."

The by-law also provides for the use of cement blocks in building construction, as follows: "The exterior walls of buildings, not more than 35 feet high, may be built of concrete blocks, as long as the hollow space does not exceed one-third of the superficial area. These blocks must be at least three weeks old, and shall be constructed of the same quality of cement specified for reinforced concrete."

Sir Aston Webb.

A provision is also made stipulating that "hereafter no building shall be erected or altered to exceed one hundred feet in height, provided that buildings furnished with auxiliary pumps and other special fire extinguishing appliances, and spires, towers and domes, may be erected to a greater height if the plans thereof have been submitted to the Inspector of Buildings, and approved by him in the Council." In connection with this latter, the proviso might well have been made that even in buildings of much smaller size than those reaching a height of one hundred feet, an auxiliary plant for fire protection should be compulsory.

A commendable regulation has been made whereby wooden signs shall measure no more than two feet in height, ten feet in height being the limit for others of material other than wood.

The building bylaws of the city of London, Ont. are being revised and the City Engineer is paying special attention to that portion respecting the erection of fire-escapes.

SIR ASTON WEBB.

Architect to King Edward VII.

Through the courtesy of the "Architect and Builder's Journal," The Architect and Builder is enabled to reproduce the above portrait of Sir Aston Webb, architect to King Edward VII., who was presented with a medal by the American Institute of Architects at their fiftieth anniversary and fortieth annual convention, held at Washington, January 7, 8 and 9, this year.

THE RELATION OF CONTRACTOR TO PROPRIETOR.

(Written specially for the Canadian Architect and Builder)
by W. M. Brown, C. E.

In the consideration of this subject there are several aspects in which it may be viewed. The first of these is the relation which exists in the framing and acceptance of a mutual contract. There are a few principles of vital importance that are involved in such an undertaking, and it is well that they should be examined and carefully considered before the seal of signature be affixed. There is no doubt that there are unscrupulous proprietors, who seek to gain their own ends by certain measures they adopt in connection with contracts that are unworthy of the name of fair dealing, while there are many of a different class who treat their contractors with respect, consideration and liberality. Again, there are contractors, of good and bad reputations, who put out work in accordance with these respective characteristics.

It is necessary that something be done to protect the interests of both parties in connection with acceptances of contracts and their proper fulfilment. Although mutual confidence may exist between proprietor and contractor, there is no saying when a dispute may arise that will alter their friendly relations. Therefore, it is advisable that clauses should be inserted in the contract that will protect the interests of both parties, so far as the contract stipulations are concerned.

After the several items of the contract have been duly considered, and the contractor and proprietor alike are mutually satisfied, the contract should be signed by both parties, as a guarantee of good faith. When both parties operate harmoniously together there are better prospects for the work being carried out to a satisfactory issue than if the eye of suspicion were continually directed upon the contractor.

It is a general axiom pertaining to human nature that where we repose confidence in anyone it is frequently reciprocated by him. Yet there are several conditions, usually attached to contracts, which we would now indicate. The first is the amount required to be stated as a guarantee for the proper completion of the work within a stipulated period of time. The amount agreed upon is generally a percentage, regulated by the total cost of the building to be erected. Again, there is sometimes, especially in large contracts, a clause that specifies the instalments to be paid to the contractor at intervals, according as the work progresses. These two conditions are very good measures to adopt for the proper execution of the work, as they do not prejudicially affect either party, unless a breach of contract occurs. They are rather incentives to the contractor to perform his work expeditiously and satisfactorily, since he is assured by the latter term of contract (regarding the instalments) that he will be able to meet his wages and material bills at the proper times. On the other hand, the proprietor is often called upon to furnish a bond of security that he is in a financial position to meet the demands of the contractor for the whole amount of cost of the building to be erected. This is also a good condition in the contract, for it not only secures the contractor, but it also gives confidence to the manufacturers, with whom the contractor deals, for the prompt supply of material required.

In general, the architect is appointed to oversee at times the erection of the building, but in extensive

contracts, sometimes, an inspector is constantly engaged to superintend the work, and is empowered to cause to be altered, replaced or rejected, all defective material or workmanship. This is a most satisfactory condition to be attached to the contract, and well repays the extra expenditure entailed. But, even beyond this, an "arbiter" is sometimes appointed, who is generally an expert in building operations, and whose judgment may be called upon in extreme cases of dispute. His decision is described as final in regard to the carrying out of every particular in the contract and specification, and the satisfactory completion of the work to all concerned.

All these conditions, which must be stated distinctly in the contract, are the basis of relation betweeen the contractor and proprietor. But the proprietor must be bound in some measure to supply proper and satisfactory materials that shall stand the test of durability and permanence in the construction of the building, which question not only affects the contractor, but also the safety of the general public. For, should there be stipulated an inferior class of material that would not stand these tests, then accidents of a serious character might occur. To prevent in some measure their occurrence, there is generally consolidated a "guild court" in large European cities, where the architect's plans are submitted for examination and approval or rejection. The referees on the bench are in general prominent men in the building trade, who are presided over by a "dean," or chairman. His office, along with these gentlemen, is to consult the Master of Works or City Architect regarding the plans submitted, to examine whether they meet all the requirements described in the Buildings Regulations Act, and, if necessary, cause alterations to be made on the plans, before a "lining" be granted. This is also an excellent institution in that it affects both a contractor and proprietor in the erection of buildings, and gives them confidence that, if everything is carried through according to the law, all will be well.

But there are also city inspectors of buildings, who may call at any time to examine the operations, and if there be any failure to meet the requirements, it may be a serious matter for both contractor and proprietor. Penalties are often imposed upon the deings have to be pulled down and reconstructed. linquents. Besides, sometimes portions of the build-

These are some of the prominent features in connection with the relation of contractor and proprietor, in order to ensure mutual harmony between both as to the faithful and satisfactory completion of the building. If these be carefully attended to and fulfilled, not only may these objects be attained and the safety of the public be protected, but a building will be erected that is both well adapted for the purposes intended and a credit alike to contractor and proprietor.

DEATH OF MR. WM. BRIGGS.

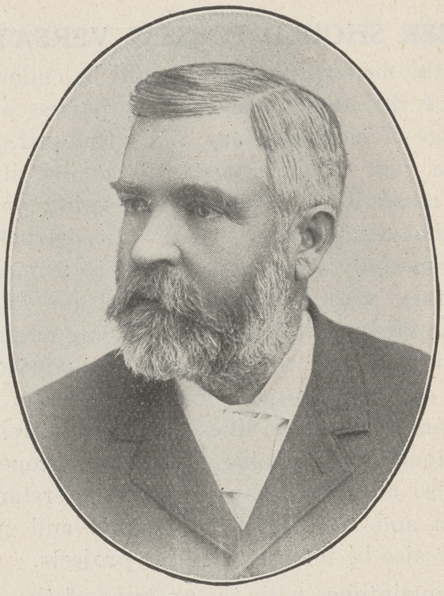
At the advanced age of 88 years, Mr. William Briggs, a retired builder and early pioneer of Toronto, passed away on Friday, April 12th, at his late residence, 9 Maitland street. Deceased was a native of Hull, Yorkshire, Eng., and came to Toronto nearly 65 years ago. He was a member of the York Pioneers' Society, and also a life member of St. George's Society. Twenty-five years ago Mr. Briggs retired from active business, but had been unusually well up to three years, when he was knocked down by a street car, from the effects of which accident he never fully recovered. Mr. Briggs was a staunch Conservative in politics, and was a warm personal friend of Sir John A. Macdonald. The late S. R. Briggs, contractor, was a son of deceased. Two children survive, Mrs. W. A. Lyon and Mr. G. H. Briggs, both of Toronto.

NEW USE FOR SUGAR.

Experiments have recently been made to prove that sugar is a valuable ingredient in mortar and cement.

DEATH OF MR. DAVID ROBERTS.

A prominent architect of the city, and one who has left behind him many monuments of his artistic taste, passed away on Wednesday, April 10th, at his late residence, 480 Huron street, Toronto. Mr. Roberts was in his sixty-second year, and had spent practically all his life in the city. He was the architect for the palatial residence of the late George Gooderham on Bloor street, and also designed that of the late Thomas G. Blackstock, immediately north of it. In private life he was a man of retiring disposition,



THE LATE MR. DAVID ROBERTS.

but, nevertheless, had a wide circle of friends. He was also a member of many of Toronto's leading clubs, and was a past president of the Toronto Rowing Club.

Mr. Roberts was unmarried, and is survived by one brother, Mr. Robert Roberts, of Sparta, and three sisters, Mrs. G. A. Philp, of St. Thomas; Mrs. J. A. Philp, of Sparta, and Miss Florence, who resided with

THE LATE MR. WM. BRIGGS.

him. One brother and one sister predeceased him, Mr. Thos. Roberts, of Sparta, and Mrs. P. S. Furness, of Oakville.

In conseqnence of the growing local demand for building material a company of Strathcona business men have organized to establish another brick manufactory in that town. Machinery for the new plant is already ordered and will be rushed forward as quickly as possible. Mr. E. A. East who has had many years experience as manager of brick making establishments in England has been engaged to install the machinery and operate the new yard.

CANADIAN PLUMBER HEATING AND LIGHTING ENGINEER

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers.]

PLUMBER SHOULD POSSESS VERSATILITY.

That the modern plumber should be endowed with a love of the æsthetic as well as possess a general knowledge of civil, sanitary and structural engineering, is a view that is constantly coming into more general recognition. There is a growing public sentiment that demands the artistic in construction, and this is especially true with regard to plumbing and all sanitary work. Combined with his knowledge, more peculiarly technical, the plumbing engineer will find that it is well to have some acquaintance with the law, as his duties will probably call him into different provinces and cities, where different codes and ordinances concerning health and property prevail. Also he should have a good understanding of contracts and the rights of tenants and patentees who may also be interested in his projects.

An acquaintance with the customs of the different building trades will assist in the art of accurate estimating and will facilitate the speed of construction, and the correct execution of the design. He should be up-to-date on the costs of materials and of patented articles, and on the cost and capacities of common and skilled labor.

The rapid evolution of modern engineering makes it difficult to prophesy what duties may fall to the specialist in plumbing.

SUCCESSFUL HEATING BY HOT AIR FURNACE.

In considering the heating of a modern building by means of a hot air furnace, the first and most important consideration will be the location of the furnace itself, and of the registers. Air, like water, will always flow in the direction of least resistance; therefore, it naturally follows that in placing registers in a room great care should be taken to favor that location where the least resistance will be met with from the incoming flow of air. As cold air is denser and heavier than warm, it follows that the proper location for a register in a room should be the warmest place in that room, i.e., on that side farthest from outside influences. Having first located the registers, place the furnace, keeping three facts in mind. First, remember that the greater the elevation of a warm air pipe the more rapid the flow of air; second, that the air will flow more rapidly toward the point of least resistance; third, that the velocity of the air is dependent on the height of the outlet above the furnace and on the amount of frictional resistance in the pipe, in other words, on the length of the run and the pressure resistance in the room in which the register is placed. Therefore rooms having the greatest exposure in the direction of the prevailing winds, on the first floor, naturally should be nearest to the furnace and should have a larger pipe and register. Rooms which are remote from the furnace, necessitating a long horizontal run of pipe, should have larger pipes. Aim to minimize the frictional resistance in all pipes by avoiding all square turns or abrupt angles. Insist on having at least one inch rise to the running foot of pipe from the furnace to the register. Long runs of pipe, especially when going through cold rooms, should be wrapped with asbestos paper; pipes going through stone or brick walls should have thimbles one inch larger diameter than the pipe. In the adjustment of the pipe work, bear in mind that the pressure of the air is equal on all pipes at the furnace. If, therefore, some of the pipes do not flow as freely as others, the cause of that trouble may be looked for either in the frictional resistance in the pipes, pressure resistance in the rooms into which these pipes lead, or on the pressure of an adjacent pipe, having the advantage of elevation, and taking more than its proportion of the heated air. Should the trouble be caused by frictional resistance, look for obstructions to the free and natural flow of air, such as abrupt angles, etc., and remove them. If this does not furnish the remedy, then increase the size of the pipe. If the trouble is caused by pressure resistance in the room itself, this resistance is caused by air pressure in the room, and some outlet must be provided before satisfactory results can be obtained. A very satisfactory solution to this difficulty can be had by cutting an opening in the base-board of an inside partition between two studs, and utilizing the space between two studs and plaster walls for the vent duct. The plates on top of the studs must be cut, and the duct be unobstructed to the attic. Generally speaking, the air will find its way out of the attic, but in case it does not do so, an opening can be made in some unused chimney, or some other means employed to overcome the difficulty. When inside air is used all doors must be left open and chimneys or fireplaces closed.

STEAM MAIN QUICKLY REPAIRED.

The repairing of a steam main, 6 inches in diameter, has been thus described by Mr. Henry Jostes, of Willoughby, Ohio: A crack developed in the pipe, running half-way around one of the flanges at its junction with the pipe. A peice of flanged cast iron pipe about 6 feet long had to be removed and a new length of pipe ordered. Meanwhile the plant had to be kept running and temporary repairs quickly made. The pipe was cut off by a 12-inch hack saw as close to the crack as possible, and the end filed up smooth and square. It was then found to be just 2 inches short. Two blank flanges were then drilled to fit the flanges in the pipe line, and three jackets were procured, two of them being placed between the extra flanges and the flange of the old pipe in the line, and the other was placed on the top of the two extra jackets, and the cut-off end of the broken pipe was placed against the new jacket mentioned. A set of bolts long enough to pass through the remaining flange on the broken pipe and its companion flange in the line, also through the two new flanges and their jackets and through the fixed flange at the other end of the break in the steam line, was procured. The cut-off end of the broken pipe was carefully adjusted so as to be central with the extra flanges and jackets, and while held fast in that position the nuts were screwed up on the long bolts, and the broken piece of pipe, together with the extra flanges and jackets, clamped firmly together. So well did this arrangement work that after the new piece of pipe arrived it was not put in position, the long bolts holding the pipe line in good operating condition for many years.

MODERN STEEL BULDINGS.*

By Mr. John M. Ewen, M. Am. Soc. C.E.

I shall speak to you this afternoon about modern steel buildings, and also about the modern methods of business organization which are necessary to the rapid and efficient construction of such buildings.

The first big building in which the idea of a steel frome was used to any extent was the Home Insurance Building in Chicago. This building was erected in 1883. Only 24 years have passed since that time. You can see, therefore, that the whole revolution in modern building construction has been condensed into a space of less than a quarter of a century.

The principle first embodied in that building has completely changed the character of big building construction. But there has been a change, not only in the buildings themselves, but in the methods of organizing the architects, the engineers, the contractors, and the artisans who construct the buildings. Fifteen years ago the erection of an eight or ten story building was considered a good year's work. To-day a building twenty-five or thirty stories high can be erected within that same length of time. This change is due to improvements in methods of work. The modern construction engineer, engaged in the erection of big buildings, has a business organization which differs from the business organization of 25 years ago almost as much as the steel building itself differs from its solid-masonry predecessors.

As an example of the rapidity with which a modern engineering force can work, we may take the Sears-Roebuck plant on the West Side of Chicago. This plant consists of four large buildings. The largest in the group is ten stories high, four hundred feet wide and sixteen hundred feet long. The total cost of the plant, including all buildings, was more than four million dollars. Yet the whole job was done in eight months. In other words, building construction has not only changed, but accelerated. It is not only different in materials, but different in methods. It has not only more steel, but more speed.

And, by the way, the speed is just as important as the steel. When an old building is torn down in the heart of a great city, the owner loses his rents from the time when the old tenants are turned out to the time when the elevators begin to carry the new tenants to their new offices. Can the engineer-constructor have that new building ready in ten months, or will it take him eleven? The difference of one month is important. There are office buildings which have a monthly rental roll of fifty thousand dollars. That sum represents to the owner the difference between an engineer constructor who can put up his building in ten months and the engineer constructor who cannot do it under eleven. It is therefore absolutely necessary that the modern engineering force should be able to do its work, not only with the utmost care, but with the utmost rapidity. This means that the best type of engineer constructor, in order to be able to handle big building operations, must have in his own office, or else closely associated with him, all the different kinds of talent which go into the construction of the modern skyscraper. In other words, the modern engineer constructor is not an individual. He is an organization.

You will be able to see what I mean if I just name the different kinds of trained men who ought to be included in an engineering force competent to perform a modern building operation with the smallest possible loss of time. An architect; a civil engineer; an electrical engineer; a mechanical engineer; a structural engineer; a sanitary engineer; a fire protection engineer; a purchasing agent; a construction superintendent; an operating engineer; an accountant. For the best work, it is no longer advisable to have all these men in separate offices of their own and to call them in from time to time in an advisory capacity to superintend their particular part of the work. It is better to bring them into what is, in effect, a single organization. They must work like the players in a football game, not as individuals, but as a team. And they must have a captain, whom they all trust and whom they all obey. He is responsible for every play in the whole game. He directs every movement. But he must have men under him who know their own specialties, just as the left tackle in a football team knows how to be a left tackle, or the half-back knows how to be a half-back. The captain can then send that team down the field and have it under complete control, and know what every man is doing every second. The difference between the old style football of fifty years ago, when the players roamed all over the field very much at their own sweet will, and the modern organized football, in which the whole team is under perfect control and moves like one man, is the difference between the scattered individuals who used to collaborate in the construction of a building fifty years ago and the modern, compact engineering force which brings all those individuals together in one team and which can calculate, almost to a day, the exact time which it will consume in getting a certain piece of work done.

Let us begin now at the beginning, and see what happens from the time when a man decides that he wants a new building to the time when that building is handed over to him, ready to be used. We will suppose that our man comes to the office of an engineer constructor of the kind we have been talking about. He explains that he has an old building which will have to be torn down, and that he wants to replace it with a modern office building, on which he is willing to spend a certain amount of money. He naturally wants as much done with that money as possible. The engineer constructor now proceeds to make a prophecy of that new building, complete in every detail. There are men in the office who can estimate the cost of every particular kind of thing that will be needed. Each man can make a pretty fairly accurate forecast of the expense that will be connected with that feature of the building in which he is particularly interested. The advantage of such a careful estimate of prospective cost is manifest. The owner of the building then knows exactly what kind of building he can afford, and just about how much money he will have to spend. This is an advantage which in former days it was sometimes very difficult to secure.

There have been times when an architect would draw plans that were attractive to the owner and that promised a building of a kind that he would enjoy possessing. These plans having been all made, and the dimensions and decorations of the building having been decided upon, the different contracts for steel, brick, granite, etc., would be awarded, one after the other. Everything would go on pretty well, till one day the architect would come to the owner and say: "Well, I am sorry, but that building will cost three hundred thousand dollars more than we thought it would." In fact, there is one architect who always introduces some humor into the situation, and says: "Well, you'd better go out and take half a million dollars more away from somebody. We'll need it before we get through." These things are often quite annoying to the owner. They are avoided when architects and engineers work out the plans together, and when the architects can compare their ideas of what would be desirable with the ideas of the engineers as to what is financially possible.

The exactness with which a financial estimate can be made was seen in the case of the new County Building for the City of Chicago. When the plans for that building were being drawn up it was shown that there was a certain appropriation for it, and every effort was made to draw the plans in such a way as to make allowance for every possible detail and still keep within the appropriation. Finally, after the estimate had been made, and after the specifications for the steel contract, the granite contract and all other contracts had been printed, showing just

* Paper read before the students of the School of Practical Science, Toronto.

what was wanted, the contractors were all asked to come in and bid on the work. When all the bids were in, and when all the contracts had been awarded, it was found that the actual contract cost was only fifty thousand dollars away from the estimate of five million dollars that had been made before any of the contractors had named their price. When building can be done this way it saves the nerves of the owner. If the estimate is too high, he can cut his plans and try to satisfy himself with a more modest building. If the estimate is satisfactory, he can order the engineer constructor to go ahead.

The engineer constructor must now plan his campaign like a general. He must not allow a moment to be lost. And, in order to avoid the loss of a moment, he must lay out a complete time schedule for his building to follow. The civilian is likely to imagine that the general of an army simply starts out in the direction of the enemy and wanders along till he finds him. In the same way the man who is not familiar with engineering practice is likely to think that the engineer simply starts building and keeps on building, till some day he gets through. As a matter of fact, the first thing that an engineer does when he begins a building, is to calculate practically the exact day at which that building will reach each successive stage in its construction. In other words, he writes a diary for that building, but he writes it beforehand, instead of afterwards. This table of dates shows the exact stage at which the building is scheduled to arrive on the days mentioned. It gives everybody connected with the construction of the building his cue for coming on and going off. It is th running-time for the construction engineer, just as the timetable of a railway is the running-time for the locomotive engineer.

As we go on now with our building, we will suppose that the owner wants a building with a steel frame. It is a mistake, however, to suppose that a steel frame is absolutely essential to the construction of a high building. There is one reason, among others, why a solid masonry building would be unsatisfactory to the modern owner. The walls of such a building have to be extremely thick. They must be immensely broad and strong, in order to support the weight of the structure. The consequence is that a great deal of space that might be used for offices has to be used for walls. If such a building had a steel frame, the walls would be so much thinner that the floor space, capable of being devoted to offices, would be increased by twenty-five per cent. Obviously, it is to the advantage of the owner to build with steel. The old County Building, Chicago, furnished us with an illustration. The walls of this building were twenty feet thick at the first floor. The walls of the new building, which is steel construction, at the first floor, are only three feet thick. The saving in floor space is obvious.

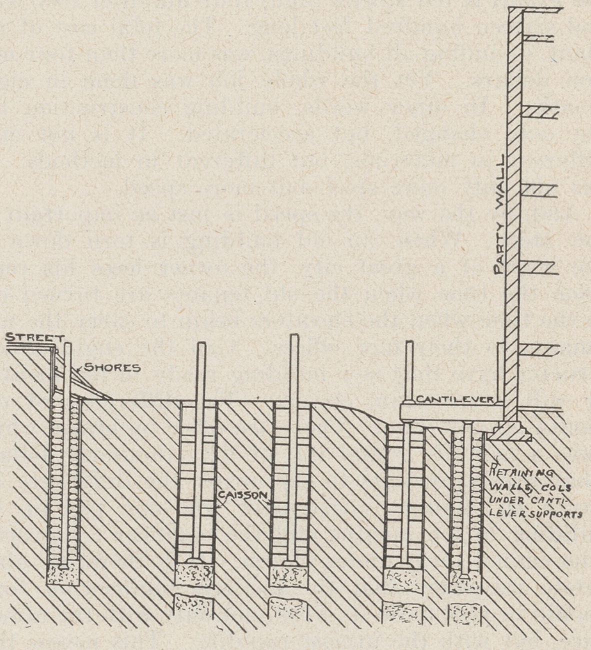
There is also another reason for preferring steel frame buildings of the most modern construction to buildings of the old type. This second reason is their superior safety.

Masonry by itself, or slightly and imperfectly supported, cannot sustain a severe shock or jar of the kind given by an earthquake. This was demonstrated in the San Francisco disaster, where buildings of the old type tumbled down, while the steel frames of the modern buildings were practically intact after the earthquake and after the fire. The reason is to be found in the method of construction. The steel columns and beams were so firmly fastened together with rivets, and so strongly braced, that the whole framework was practically as stiff and rigid as a steel cage. The masonry walls were carried on the outside steel beams, and were tied to those beams with strong iron anchors at every floor. Finally, another precaution was added. Under the window sills of each story a flat band of iron, about five inches wide and a quarter of an inch thick, was laid in the masonry and carried all the way around the whole building. This band of iron is riveted to the columns as it passes them, and acts as a horizontal support for the masonry. The whole building could actually be tipped several feet out of a vertical line without endangering its integrity.

For reasons of safety, therefore, as well as the desire to get more floor space, the owner of the prospective office building is likely to want a steel frame.

The plans made by the engineering force for the new building will now show exactly where every piece of material is to be put. When the building is completed, the thing that seems remarkable is its size. When it is being built, the thing that seems remarkable is its infinite number of small details. All these details are represented in the plans. These plans, specifications, blue prints, and documents of all sorts, multiply at an astonishing rate. If they were all brought together in the case of a building like the Cook County Building, in Chicago, and put on a scale and weighed, they would tip the beam at something like thirty tons. At this stage it is not the big work of engineering practice, but the small work, that attracts the eye. On the tables in the architects' and engineers' offices, where the plans are kept, they give a complete picture of the building, which has not yet been begun. The smallest piece of steel that goes into a column up on the fifteenth floor of the building is already in place, its exact place on the plans. The building exists completely in imagination before a single stone has been placed in the foundations.

The engineer constructor, if he is in complete charge of the building, will now proceed to let the



Old Building Down, Walls In, Caissons Completed and Columns Set.

contract for tearing down the old building. The contractor who does the job of taking it away will make good use of all the usable materials it contains. He will have a big yard or warehouse, in which the steel, the iron, the stone, the bricks and the other materials will be sorted out and heaped up, and sold to people who can use them. In some cases the stone from the old building is crushed on the spot and mixed with sand and cement, to make concrete to be used in the new building.

While the old building is being battered down and carted away, other contracts are being let. It was formerly customary to follow up the demolition of the old building immediately with the excavation of the space for the foundations and basements of the new building. It is now feasible, however, to do the foundation work before doing the excavating. This seems like a contradiction in ideas. But the process

is comparatively simple. And it saves a great deal of trouble.

If you follow the old method and dig the big hole in the ground before you lay your foundations, you have to support the sides of this hole with long, strong timbers, and you are constantly worried by the fear that some of these timbers may slip and break, and that the building next door, or the pavement of the street, may feel the jar and may be more or less seriously damaged.

Suppose, for instance, that the building has been torn down, and that you have proceeded to make a large excavation. You can readily see that it is necessary to take great precautions, in order to protect surrounding property from injury. Instead of taking this risk, you may, if you please, allow almost all the dirt to remain in place and get your foundations all in before you dislodge it.

You begin by digging a trench along the sides of your lot. The sides of this trench you support with horizontal planks, which are braced apart by screw braces. Finally, when the trench has reached the desired depth of your lowest basement, you put in a concrete base at the bottom of it and install vertical steel beams all the way up the middle of it, from bottom to top, and brace these beams with jack screws set between them and the planks which still form the sides of the trench. The pressure from the street and from the earth and the buildings surrounding your lot is now transmitted across the trench through the planks and the jack screws and the steel beams and is now successfully resisted by the big core of earth which you have left still occupying the whole centre of your lot.

You are now ready to dig the wells for your caisson foundations. At various spots on your lot, that is, wherever you intend to have a steel column for the support of your building, you begin to make a a round hole. The rest of the earth on the lot remains unexcavated, just as it was. All the excavating you now do is simply for holes which will afterwards be filled with concrete and used to support your steel columns.

The depth to which you dig these holes will depend upon the size of the building and the character of the soil. In Chicago you may choose between two different levels. One is hard pan. The other is bed rock . The first is found about sixty feet below the surface in the down-town district. The second is not reached till you have gone down one hundred and ten feet. In the case of a large building it is usually advisable to go all the way down to the second level.

As these wells are dug they are lined with heavy strips of wood, called lagging, and they are further protected by the insertion of metal rings, which keep everything steady and transmit all pressure from every side. The digging is usually done by hand, with shovel and pick, and is good, hard work, especially when the laborers get down toward bed rock. Recently, in a caisson well six feet in diameter, two men worked for eight hours and made only eight inches of progress.

When the wells have finally reached the requisite depth, they are filled with concrete to the level at which the bases of the columns are to be set. The bottom of the well has previously been somewhat enlarged, or "belled out," so as to transmit the weight of its load over a large area. The rest of the well is of the same diameter throughout.

These columns of concrete are commonly called caissons, though they do not, strictly speaking, deserve that name. The word caisson, in engineering practice, really refers to a foundation which is made under water by men who are working in a chamber filled with compressed air. Caisson disease is the disease which men get through breathing the compressed air in a chamber of that kind. Our caisson wells in Chicago are not built under compressed air at all. They are simply dug with a shovel and a pick, just in the same way in which any ordinary excavation is made.

General William Sooy Smith, a famous American engineer, recommended the use of what we now call caisson foundations at the time when the Masonic Temple was built, twenty years ago. At that time the idea was not thought feasible. Later, however, it was tried in the Stock Exchange Building of Chicago, and it soon began to win its way into favor.

Of course, the other kind of foundation is still used. In many cases long piles are driven down into the ground and the building rests on them. Care must be taken, however, to see that the heads of the piles are driven down below the water level. Otherwise, they will rot.

In other cases, the foundations consist of what might be called rafts of steel beams, placed closely together, and set in concrete. These raft foundations, or floating foundations, support the columns, which in turn support the floors.

One disadvantage about pile foundations and about raft foundations is that they settle when the weight of the building is imposed upon them. It is therefore customary in such cases to build the first floor of the building several inches higher than it ought to be, and then wait for the whole structure to settle down to its proper level. In some places in the downtown district of Chicago you will notice that the sidewalk slopes from the building to the street. This means that the building did not settle as much as its builders thought it would. In other cases, the sidewalk slopes the other way. That means that the building was made heavier than was expected, and that it settled too much, so that the slope of the sidewalk is toward the building from the street. Another disadvantage about raft foundations is that they take up a great deal of space. Sometimes they even extend over into the next lot under the adjoining building.

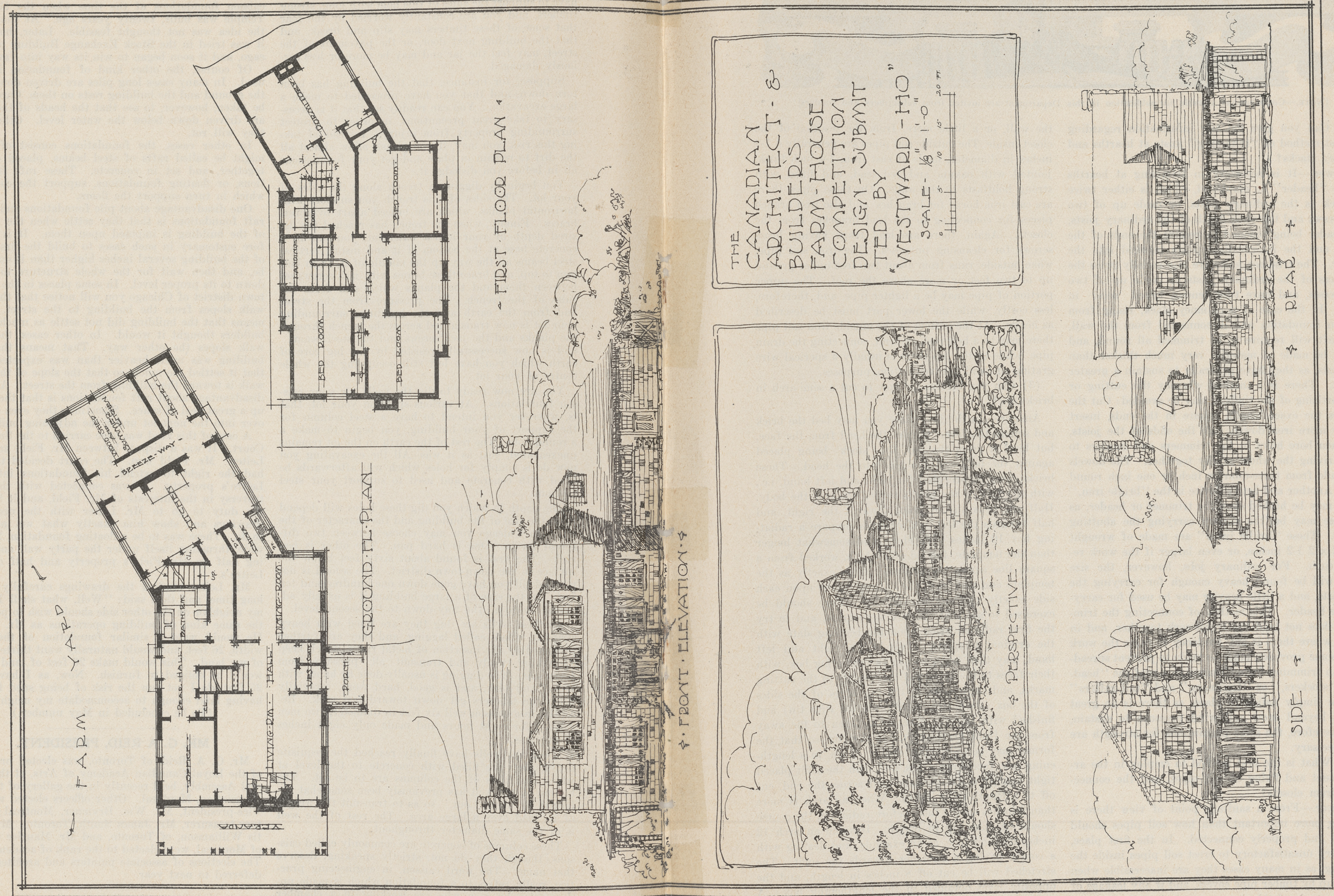
A case of this kind was once carried to the Supreme Court. It was a dispute between Mr. Field and Mr. Leiter. Mr. Field won. The court decided that he had the right to extend his foundations into Mr. Leitre's property. I was connected with the controversy in the interests of Mr. Field, and it became my duty to go to Mr. Leiter with the necessary drawings and show him exactly what we intended to do. There was to be a floating foundation, 26 feet wide, thrusting itself under the party wall and resting half on Mr. Field's property and half on Mr. Leitre's.

Mr. Leiter studied the drawings carefully for a long time, and then said: "Well, what shall I do if my neighbor on the other side should wish to perform the same kind of building operations as Mr. Field? He would want a similar foundation of the same width, 26 feet, and would naturally want thirteen feet of my land. This would make 26 feet of land that I would be obliged to furnish. Now, as I have only 25 feet, do I not run the risk of being sued for not having land enough to accommodate my neighbors?"

(To be concluded in May number.)

MR. G. A REID, PRESIDENT.

Mr. G. A. Reid, of Toronto, was elected president of the Royal Canadian Academy of Arts, at the General Assembly, held recently in the gallery of the Art Association, Montreal. Other officers elected were:—Vice-president, Mr. Wm. Brymner, Montreal; secretary-treasurer, Mr. James Smith, Toronto. Mr. Curtis Williamson, of Toronto, and Mr. Maurice Cullen, of Montreal, were elected to the rank of academicians. The elections of associate painters and architects was deferred to next year.


THE CANADIAN ARCHITECT & BUILDERS FARM-HOUSE COMPETITION DESIGN-SUBMITTED BY "WESTWARD-HO"
SCALE 1/8" = 1'-0"
FIRST FLOOR PLAN
GROUND FL. PLAN
FARM YARD
VERANDA
BED ROOM
HALL
DINING ROOM
LIVING RM
OFFICE
REAR HALL
PORCH
BREEZE WAY
FRONT ELEVATION
PERSPECTIVE
REAR
SIDE

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers[·

(1) Can you give me any information regarding the best method of "trimming" joists at hearths and chimney stacks?

Answer.—It is necessary in trimming at hearths that a "header" be employed, which is either twice as thick as the ordinary joists, or made up of two thicknesses and the same depth of the ordinary joists, the header being tenoned to receive the ends of the joists, and the intermediate joists tenoned into the header. The trimmer joists are also usually twice the thickness of the ordinary joists or made up of two thicknesses, and have tusk tenons, keyed solid in place. In the case of a chimney stack, rising from its own foundation and disconnected from the wall, the shaft will require to be trimmed all round, and should be made of material very much thicker than the joists, as they have generally to sustain a greater weight. There is a method whereby the cutting or the mortising of the timbers may be avoided: Cut the timbers the exact length, square in the ends, insert two or more iron dowels into the ends of the joists, and then bore holes in the trimmers and headers to suit, driving the whole solidly together. The dowels are made from three-quarter inch or one inch round iron. Another and better device is the "bridle iron," which may be hooked over the trimmer or header, as the case may be, the stirrup carrying the abutting timber. These "bridle irons" are made of wrought iron, 2 x 2 1-2 inches, or even larger if the work requies such. For ordinary jobs, however, the size given will be found heavy enough for carrying the tail joists, and a little heavier may be used for carrying the header. This method of connecting the trimmings does not hold the framework together, and in places where there is any tendency to force the work apart some provision must be made to prevent spreading. In trimming for a chimney in a roof the "headers," "stockers," or "trimmers," and "tail rafters" may be simply nailed in place, as there is no great weight beyond snow and wind pressure to sustain, and, therefore, the same precautions for strength are not necessary.

(2) What is the best method to employ in the arrangement and fixing of soil pipes, and the connections from closets?

Answer.—From a sanitary point of view there is nothing more important than how soil pipes should be laid and properly connected. In the first place, it is very unsatisfactory to erect soil pipes inside the building, as in many cases they are inaccessible when closed up by timber pipe covers, and if any leakage of soil occurs, or fetid air escapes, it is difficult sometimes to get it immediately remedied. The safest and most satisfactory method is to have the soil pipes erected outside the building, yet just the thickness of the wall, or a little more, from the position of the closet inside. The outside soil pipes are generally 4 1-2 inches in diameter, made of cast iron, 1-4 inch thick, jointed with oakum and red lead, and fixed with strong holdfasts to the walls. On these pipes there are cast iron horns for branches, and also iron branch pieces for connecting to the lead branches from the closets. Again, there are lead traps having brass screws for cleansing purposes. The iron soil pipe, when outside, runs from about two feet under ground up to two feet or more above the roof. The upper portion of pipe may be a lighter pipe, and, therefore, less costly, while the lower part must be described as heavy. At the bottom of the outside iron soil pipe there may be a heel rest, or bend, connecting the drain pipe, while at the top there is usually a sperical wire grating or cowl for ventilation purposes.

(3) Can you inform me how to cut a semi-arch in brickwork?

Answer.—In the first place you may bed the brick and square the face. Square the head from the face, but level it from the bed, the stock being placed against the bed, and the blade to the head. These bricks must be prepared for right and left hand, i.e., with the face of the bricks turned towards the body. Half the beds should point towards the right, and half towards the left. Afterwards prepare a radiating box 10 inches wide clear, and somewhat longer than the template, the sides of which, worked from a square line across the bottom, radiate exactly as the template and also have the cutting marks upon each side exactly opposite one another. Care should be exercised to see that the box is accurate, and to try the first radiated brick upon the bedding slate with the original template. Two bricks, right and left hand, may then be placed in the radiating box, with their faces to the sides and their soffits to the cutting marks, and sawn close to the top edges of the sides of the box (the latter being protected with tin) and finished with the file, care being taken to file away from the front arris of side of the box, so that the former may be thoroughly sharp. Then, in a lengthening box, face downwards, and with the soffit placed tight against a straightedge held across the end, cut off to a length of 9 inches. When an arch is more than 9 inches on the face, before radiating, the course should be made up in length. Imagine an arch 12 inches deep on face, as an example, and dealing with a course having a stretcher towards the soffit. The stretched will be cut off 8 inches in length, and the opposite level obtained in the lengthening box. A bat over 4 inches in length, beaded, faced and beveled, will be fitted to the top of this, the template applied, the brick scribed to the length of the cutting side, and to the square mark on the bed, the two marks on

the brick connected by the scribing saw and sawn off square with the face. By this method the course is cut off to length, and the top bevel obtained at the same time. It may be noted here that the 9 inch lengthening box can be used for any odd measurements by nailing a stop or fillet across the bottom of the box and parallel to one squared end, according to length required, the worked end of the brick being placed against the stop, and the piece not required cut off to the end of the box. For an arch having a 9 inch soffit, it will be readily understood that a face stretched would have to be taken to 4 1-2 inches in a reducing box and backed up with a properly squared and beveled bat; and that for a soffit stretcher the brick would be bedded, the face beveled for the soffit, and the heads acting as the face squared from the bed and soffit. By placing the brick soffit downwards in a reducing box, 4 1-2 inches deep, the opposite bevel, after sawing, would be worked upon it and afterwards made out on the face by a beaded, squared and beveled bat, and cut off to length to the template. Every arch ought to be keyed in with a stretcher towards the soffit. It will be ascertained that, counting the courses in half the arch, and including the key, if there be an odd number, then there will be a stretcher for the start or upon the skewback, and a stretcher for the key; if an even number, then a header for the start, and a stretcher for the key.

W. M. Brown, C.E.

A contractor writes:—(1) A question has been asked me with regard to the proper number of openings in the front of a house. To make my question plain, I have been informed that a front should always have an odd number of openings.

Answer.—The front of a house may have any number of openings, odd or even.

(2) How would you support the plates of a hip roof barn, especially the purlin plates? Of course the idea is to do without posts in the mows.

Answer.—The plate for the receiving of purlins must always be supported with framing.

A Sudbury subscriber asks:—Would you kindly give method of fireproofing shingles by steeping in lime, water and salt, with the quantity of materials to use? Would painting shingles so treated, after they were laid in position, be apt to cause rot under the shingles?

Answer.—This solution would merely retard a fire while the application was fresh. You had better lay the shingles in mortar or on heavy asbestos paper. This solution dries out entirely in a short time, and results from its use are practically nil.

PRACTICAL STAIRBUILDING.

By W. C. A. Stevenson.

(A series of articles written specially for The Canadian Architect and Builder.

Second Article.

In the last issue we disposed of the construction of a factory stairway. I would impress it upon the minds of my readers to make a thorough study of that article, as there are principles explained there they cannot afford to miss, in fact if you would master it you would not have any difficulty in building any straight stair. There are, however, a few more important matters to be borne in mind by the stairbuilder: the first, ease of travel; when a person ascends a stair each step means an upward and forward movement, and if the treads and risers are out of proportion, then you have an awkward stair. If your riser is high, your tread must be correspondingly narrow to get proper proportion. If the stairbuilder is following the plans of an architect, he, of course, cannot change the conditions. I have built stairs to suit the conditions of a plan made by an architect that were as out of proportion in every way as could be; when you just have so much room to work on you cannot change very much. I believe a great many architects never take the trouble to figure out the stairs properly, which accounts for so much trouble.

It must be remembered that the room given to the stairs on your plan would just be covered by the treads you put in, exclusive of the nosing or projection, and each tread is raised above the other the height of each riser. Just study the elevation and plan shown here, at (A) and (B), Fig. 3, for a moment, and you will see that it makes no difference what style of stair. This applies to all.

I will now give the methods to find the proper proportion of a step. (Note, a step is one riser and one tread.) The simplest rule is, the product of the riser multiplied by the tread should equal as nearly as possible the number 66; for example, say your riser is 7 inches and your tread is 9 1-2 inches, we see that 7 multiplied by 9 1-2 equals 66 1-2, which is a good proportion. If your tread was 10 inches your riser would require to be about 6 1-2 inches, 6 1-2 multiplied by 10 equals 65. If you have an 8-inch riser your tread would need to be 8 1-4 inches, which would produce exactly 66.

Another method is, when you have the height of riser, the number that it would require to make it 12, doubled, would be the proper width of tread; thus, say your riser is 7 1-4 inches, 4 3-4 would make it 12, then 4 3-4 doubled would equal 9 1-2 inches, proper width for tread.

Another consideration is strength. A main stair in a residence should be constructed so that it would carry at least 1,500 lbs., which would be about equal to a piano, and men required to handle it; this is about as much weight as a residence stair would ever be subjected to. A public stair of, say, eighteen steps three feet six inches wide, could have about thirty-six people on it at once, which would be at least 4,300 lbs. These are points to be considered by the stairbuilder, or architect, if there be one. You must take into consideration what the stair might have to withstand, and build it accordingly. As I take up the different stairs, I will try to show you how they should be constructed.

Another consideration is width. A main stair in a residence should never be less than 2 feet 8 inches wide, and much better 3 feet and up, to suit the conditions.

A public stair should never be less than 3 feet 6 inches and up. Public halls, theatres, etc., should be 5 feet and up.

In this article I am showing the construction of a common straight stair, with a housed wall string of 1 3-8 x 12 inch stock. Cut and mitred open or face string, 1 3-4 x 12 inch stock, 5 x 5 inch square newels, 3 x 4 inch moulded handrail, 1 3-8 x 1 3-8 inch square balusters, 1 3-8 inch treads, 7-8 inch risers, with the spandrel studded up and lathed and plastered. (Note—The spandrel of a stair is the portion below string, see elevation (B), Fig. 3, which can be finished in various ways. In extra good work it is usually panelled.)

The diagrams shown at (A), (B), (C), (D), (E), (F), (G) (, Fig 3, are as follows: At (A) is shown the plan as it would appear on a plan for working

purposes, which shows the room the stair has been allowed; in this case 12 feet run has been allowed and 15 treads are here used, which gives us a tread of 9 7-12 inches, which takes 11 feet 11 9-12 inches run. You can in most cases work an inch one way or the other, so as to have your run come out in eighths,

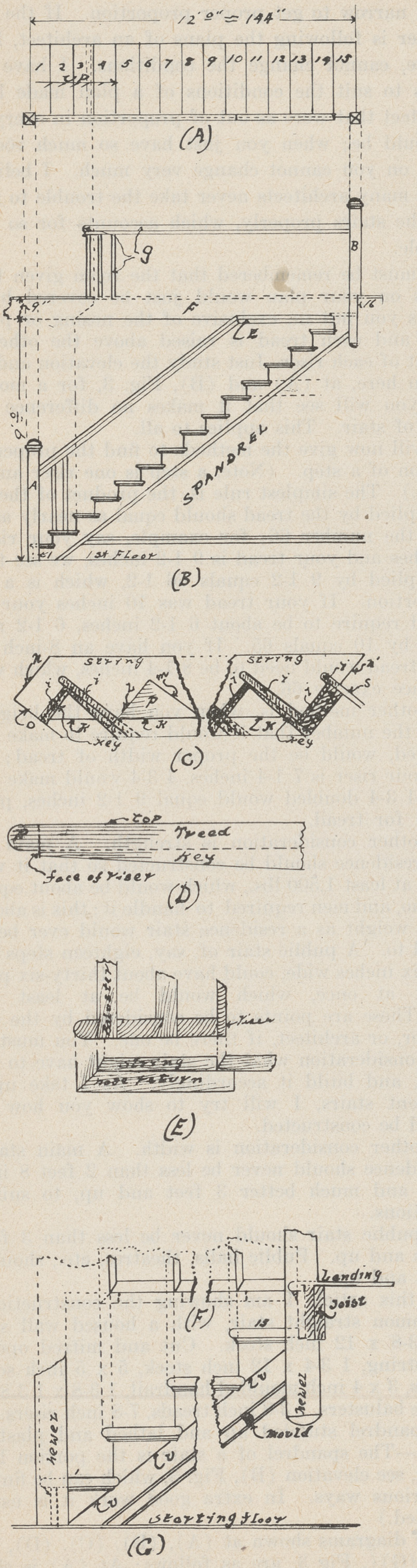


Fig. 3.

twelfths, or sixteenths. I will refer my reader back to the last article, if he does not understand how to decide the run, as it is very thoroughly explained there.

At (B) is shown the right elevation; this is termed a right-hand stair, as the rail is on the right-hand side. Here we have a rise of 9 feet ceiling and 9 inches upper joist and floor, which is equal to 117 inches, to be divided into sixteen risers. (Note—Remember, always one more riser than tread, which gives us 7 5-8 inches riser.) The explanation in the last article ought to make this part of it plain. The dotted lines show the position of the header. Plumb over third riser, giving 7 feet 4 inches head room. By splaying the trimmer, as shown by the dotted lines, we can gain 10 inches on top floor (see dotted line extended to plan (A) at H, showing the position). This stair is known as a dogleg stair, on account of the handrail stopping under the facia board F as shown at E on the elevation (B); the rough trimmer joist is placed out exactly a distance from the lath, whatever width the stair is to be outside of strings. The landing newel B is notched out around the trimmer and landing joist, so the top riser and the facia board F will centre into it, and the face string will also centre into it (Note—Remember to always work to centres in stairbuilding; this I told you in last article, but it is so important I mention it again.) The newels A and B, elevation (B), can be solid or boxed, as desired, with a moulded head built on to suit.

At G on elevation (B) is shown the handrail around the well-hole, showing balusters and the mitre for return to wall. The balusters up the stair are dove-tailed into the end of step, two to each step, one standing plumb with the face of the riser, and the other set so as to space them the same distance apart. The nosing or projection returns around and covers the dove-tails; see (E). At (C) is shown a portion of the wall string, showing the bottom and top step, housing at I in (C); at P in (C) is shown the pitch board applied to string. In this case we do not work the pitch board from top edge of string, as we did in last article on the factory stair; we draw a gauge line as seen at K K in (C) and work the pitch board on it, marking our riser L and tread M as seen at (C), then we take our templet as shown at (D) and apply it with the top, coinciding with tread line M. The point of face of riser to riser line L and the projection P gives us the shape of our nosing. The best way is to make an awl hole through the templet at P on centre of thickness of tread; when your templet is placed in proper position, make an awl mark through the hole, which gives you the point to bore. With the proper size bit you can bore the nosing.

The dotted line through templet shows the shape of tread above, and the key or wedge below. These keys must be made of very dry pine, and driven in snug. They should be glued, as a little shrinkage would cause them to loosen and the stair would squeak on walking over it, which should never be. The templet for the riser is made in the same way, only it does not require any nosing; in (C) at J is shown the position of keys. At S is seen the landing floor, at N the string cut to intersect with the base board on landing, and also at bottom. At O is the foot of string cut to floor line, at (G) is shown a portion of the face string drawn to a larger scale than the elevation, showing a portion of the newels. The line U U is the line you would work the pitch board to for this string. (Note—Do not overlook the spacing-up described in last article, so as not to have any difference in the length of strings.) The dotted lines projected up to (F) shows how the risers are mitred to the face string, and the end projection of treads are mitred and returned. If no centre carriage is used a block should be glued into each angle of riser and tread.

(To be continued.)

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THE FAIENCE MANTEL.

One of the latest conceptions in mantel construction is that known as the "Faience." It is constructed of a very high grade of enamelled terra cotta of the same name. This mantel is made up in a variety of designs, particular attention being paid to color effects, which range all the way from pearl grays, dark reds and browns to rich greens, either in dull or highly polished finish. The sizes of blocks vary considerably, from ordinary brick size to 4 inches by 8 inches, 6 inches by 9 inches, 9 inches by 9 inches, 6 inches by 12 inches, etc. Cornices and medallion blocks are finely modelled and are artistically correct. These mantels are sold by the manufacturers, and can be set up in place by any first-class brick mason, the joints being laid with colored mortar, to harmonize with the color of the tile. Varying textures of material are made, smooth, semi-rough and very rough. Good designs also are shown in mission effects, these being highly suitable for dens or libraries.

PROSPECTS FOR PRESSED BRICK IN CANADA.*

By A. BERG.

In the present and future ages we have and will continue to have a high grade of pressed brick for building purposes. It is often said that such and such a brick must be imported from the United States, because it is impossible to manufacture it in Canada. The allegation that the material is not here is nonsense; it is here in abundance. The clay deposits of this country are undoubtedly among the most extensive in the world. To take the best advantage of this, we must have the best knowledge of our resources and of their adaptabilities. The money is here; the brain is here, and the people with the highest grade of brick machinery are here, and we are convinced from our past experience that we can manufacture and produce as high grade brick in this country as can be produced by any other nation of the world.

The writer has visited the most modern brick plants throughout the world, and is thoroughly convinced that we have here every facility for making a high grade of pressed brick, with the most modern and successful brick machinery that can be obtained in any country, and, therefore, does not hesitate to affirm that there is a future success for a high grade of pressed brick in Canada

Shale is exceptionally well adapted for a high grade of pressed brick, and also permits the plant to be operated winter and summer and in wet as well as in dry weather, thus enabling us to keep our machinery in a condition that is unsurpassed for the manufacture of brick.

Pressed brick can be made from many different kinds of clay, in many cases more easily in summer and dry weather than by using shale, but when it is desired to operate a pressed brick plant continually, in dry and wet weather, in winter and in summer, the use of a storage shed, with ample capacity for supplies for the inclement weather, is advisable. In many cases the clay collected under a shed will be benefited through the so-called "sweating process," and be thus more suitable for the manufacture of brick.

*From a paper read before the Association of Canadian Clay Product Manufacturers.

ARTIFICIAL STONE.

By a recently patented process a remarkable advance in the manufacture of stone-like substances has been achieved. The patentee has discovered a method which means nothing short of a reconstruction of many well-known qualities of building stone. By a slight modification of his process, he produces all kinds of marble, one of his chief successes being the manufacture of a lithographic stone, which has been pronounced by experts as surpassing some of the best samples of the natural material.

Slag is used by this process for the production of an artificial stone by breaking it up in a breaker with crushing jaws of the usual type, and is ground to a powder in a disintegrator. The powdered slag is then mixed with quicklime, seven parts of slag being used to one of lime, and the substances are thoroughly amalgamated in a revolving mixer and subsequently "pugged" with an excess of water to form a pasty mass of creamy consistency. This is subjected to very heavy pressure in metal moulds, squeezing out nearly all the water, and formed into blocks of the consistency of chalk or stiff marl. After the blocks are quite dry they are placed in stout cylinders, from which the air is exhausted, and when a complete vacuum is obtained carbonic acid is introduced and allowed to permeate the stone for a period of three days. By this treatment the hydrate of lime becomes recarbonated and serves to bind the mass into a substance as hard as rock.

If for the slag a basis of marble, limestone, or dolomite is substituted, it becomes possible to prepare a mixture, as heretofore described, in which from three-fourths to seven-eighths consists of calcium hydrate, or a mixture of calcium and magnesium hydrates, obtained by calcining the stone. These blocks can readily be impregnated with the carbonic acid gas, by which means the lime and magnesium are converted into carbonates and serve to consolidate the mass and turn the whole substance into stone. In the case of marbles, or when making lithographic stone, a certain amount of coloring matter can be added to the paste. The finished stone or marble is capable of a high polish, and is said to possess all the weather-resisting properties of the natural rock used in its production.

CEMENT AND CONCRETE

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers]

SOME CITY SPECIFICATIONS FOR CONCRETE BLOCKS.

Apropos of the regulations for concrete blocks laid down in the new Toronto building by-law, and quoted in another column of this publication, it may be interesting to note the specifications recommended by some large building centres in the United States.

The building regulations of New York City in regard to all materials used as substitutes for brick or stone are extremely severe, requiring tests to be made on blocks the size and shape of an ordinary brick, which must show an average modulus or rupture of 450 lbs. in transverse test, average compression strength of 3,000 lbs., water absorption not over 15 per cent., loss of not more than 33 per cent. strength after freezing and thawing 20 times, and no disintegration after heating 1 hour to 1,700 degrees F. and plunging into cold water.

The City of Philadelphia for a time followed these requirements, but has lately modified them and provides that tests of hollow concrete blocks shall be made on full sized specimens. The most important requirements are: Blocks to be made of Portland cement, with not more than 5 parts sand and gravel or crushed rock; hollow space to be not over 33 per cent., (20 and 25 per cent. in lower parts of high walls); maximum load, 111 lbs. per square inch of wall; crushing strength, 1,000 lbs. per square inch of total surface of block, including opening; absorption, freezing and fire tests as in New York requirements.

Concrete blocks in the Philadelphia market have shown compression strength of 1,200 to 1,600 lbs., absorption of about 5 per cent., little loss of strength on freezing, and have passed the fire test well.

The City of Newark, N.J., requires that blocks shall be not poorer than 1 to 4; they must be no more than 36 inches long and 10 inches high, and not less than 8 nor more than 16 inches wide; the hollow spaces must not exceed one-third; they must not be used until 30 days old, and must show a crushing strength of 1,500 lbs. per square inch.

THE ASTHETIC IN EXTERNAL CONCRETE FINISH.*

Heretofore it has been the common practice to veneer first-class concrete buildings with either brick or stone in order to conceal the concrete surface, which was deemed incapable of receiving an artistic surface. This mistaken impression has been largely due to the views of architects who imagined concrete out of place in anything but concealed foundation walls. Recently, however, this idea has been so modified that considerable attention is being given to the view that, like all legitimate and substantial structural materials, concrete, too, will prove to be susceptible of artistic treatment in design and that, moreover, in a fashion unusually simple. For the first time in the history of building materials we come to deal with a plastic material which can be moulded and modeled at will. Just here, however, arises the possibility of a danger into which those who undertake to treat cement surfaces may fall. Beauty in structural design is worthy of the name only when it has character. It must not be a servile copy of the style peculiar to some other material, but must express its own individuality. Particularly in the manufacture of cement blocks, to which a rock face is usually given, is this danger possible. A flat, smooth face will always look well, but if a rock face is desired let it be produced by casting the block first and then pitching off the exposed surface with chisel and hammer, just as is done with stone. The clean fracture of the concrete thus exposed will be eminently effective and artistic, and will have all the merit that belongs to truthfulness.

Plain concrete walls might in some cases be effectively relieved by the introduction of bands of decorated blocks, having some simple ornament moulded in the face. The frequent and constant repetition of a regular pattern is artistically bad and ruins an effect which should, above everything, avoid studied regularity. Artificiality, imitation and misrepresentation are recognizable in such work at first glance.

Solid concrete walls have a great advantage over the block walls, in that they lend themselves much more readily to artistic treatment. This is especially true where they are used in suburban and country buildings, perhaps because of the touch of nature in the surroundings, which more nearly accords and harmonizes with the broad treatment that can be so effectively employed in wall surfaces. Perhaps the best sources of inspiration that can be had for such treatment are to be found in the old Spanish missions of California, which, although not of concrete, nevertheless at once suggest its use, and above all are fine examples of the artistic value of broad wall surfaces relieved by exquisitely proportioned openings, judiciously spaced and not infrequently embellished by a moderate use of ornamentation.

Assuming, then, that concrete surfaces should be as unbroken as possible, methods must be considered whereby, in more pretentious structures at least, the exposed face might be treated. A thin skin or crust of cement usually is found to cover the surface where the concrete was deposited wet and was well tamped. This crust may be removed, while still soft, by means of a stream of water applied with considerable force, or by stiff wire brushes. The particular value of this method of treatment is that it exhibits the material in its true nature and can certainly not be changed with any semblance of artificiality.

A simpler and less expensive method of securing

*Abstract of a paper read by Mr. A. O. Elzner, of Cincinnati, before the convention of the National Association of Cement Users.

an artistic effect is that of covering the wall surface with a splatter—dash coat of cement mortar applied by splashing it on with a paddle or a broom—or, better still, it may be first spread on with a trowel and then roughened by stippling with a stiff broom or brush or even a flat board, in which case the roughening is obtained by suction against the board. When such treatment as this is to be used, it may be highly appropriate in some cases, and indeed quite interesting, to decorate parts of the surface with some simple panel work or free-hand modeling.

SOME PREVENTIVES OF ADHESION OF CONCRETE TO STEEL.

The adhesive strength of concrete to steel is undoubtedly severely tried by ceaseless application and removal of load and the consequent successive production and relief of the various internal stresses which tax so severely this essential and vital factor of reinforced concrete design and construction. Passing without comment the acknowledged fact that scale or thick rust will seriously impair the adhesion, it may be said that numerous critical examinations plainly indicate that any rust on the metal (while completely absorbed by the concrete and so effectively preventing further corrosion) did materially lessen the normal adhesive power of the concrete; the bond was often found lacking opposite the rust discolorations on the concrete, while remaining firm on each side where rust had been entirely absent; and, where the adhesive bond was destroyed in the middle portion of the beam, this destruction habitually terminated in a discolored section, apparently indicating the encountering of an increased adhesive resistance at the cleaner portions of the steel.

Another fact that has escaped deserved attention is the probability that a material excess of water used in mixing the concrete apparently lessens its adhesive power. It is realized that a moderately wet mixture is desirable, in order to prevent voids in the concrete as ordinarily placed, and especially to secure sufficient plasticity to ensure a complete filling of the space around and below the network of reinforcing steel; but there seems to be a real danger that the reaction against dry concrete is being carried too far. An excessively wet concrete not only contains numerous globules of water, which, when absorbed, leave the concrete porous, but these, also, especially weaken the adhesion of the concrete to the steel, because there is a tendency for such water globules to seek the surface of the reinforcements, particularly on the under side The weakening of the bond from this cause was evident in certain beams in which the adhesion was noticeably weak, the water cavities being apparent at the bottom and sides of the steel bars.

In view of the fact that certain oils have a disintegrating effect on concrete, it may be well for builders who propose to introduce reinforced concrete floors in mill buildings or machine shops, where oil is liable to reach the floors in appreciable quantities, to exercise care in this respect. To prevent any disastrous consequences in this regard, concrete floors should be given some impervious upper surfacing. Care should also be taken to guard against the introduction of oils into concrete mixtures in the process of construction, where it is sometimes customary to paint or oil the small rods or webs of expanded metal used for reinforcing. It must not be forgotten that a film of oil or too fresh paint will stand in the way of the perfect bond between the cement and the metal, which is the very essence of the life and usefulness of reinforced concrete. Even in the case of the large metallic members of the modern reinforced concrete structure, the unripe or green condition of the protective coating is considered by many as a possible source of weakness.

MUNICIPAL AWARDS OF PUBLIC CONTRACTS.

That partiality is being shown employers of union labor in the awarding of city contracts is the charge urged against the Montreal City Council by the Builders' Exchange of that city. The trouble began when, on March 15th, the Road Committee, in awarding the contract for curbstone, passed over the lowest tender and awarded it to an employer of union labor at a considerably higher figure, the only apparent reason for this conduct being that the lowest tenderer refused to promise that he would employ union labor only. When the story of this award reached the ears of the members of the Builder's Exchange a formal protest was sent to the City Council, and read as follows:

"The question of employing union or non-union labor had no right whatever to be brought up when awarding tenders. If that were to have been an essential condition of award, it should have been definitely so stated when inviting tenders.

"Not only does this board protest, as the representative of a large body of ratepayers and property owners of Montreal, but it also protests on behalf of the leading contractors comprising the Builder's Exchange, because, by turning over the city's contract work to a mere section of labor seeking a monopoly, you are not only depriving the non-union workman of his right to earn a living, but you are also raising the whole labor market outside by the arbitrary procedure of your committee, which makes such action unjust, not only to the ratepayer, but also to the contractor.

"Hitherto representations made by this board have been politely acknowledged and ignored. The board has no intention of letting the present protest rest here, and unless accorded an early reply will take steps to have a strong deputation representing ratepayers' associations and other influential bodies wait upon the full Council. We ask in conclusion that the action of the Road Committee be not ratified by Council."

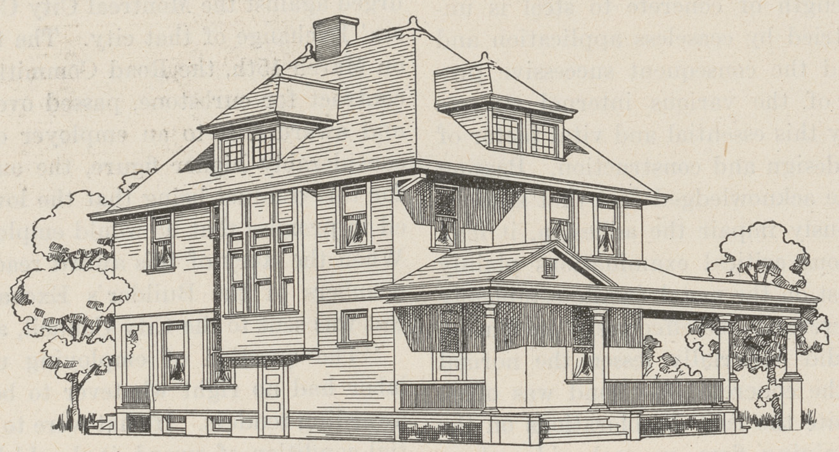
Upon hearing this communication, the Council promptly showed their attitude by adopting the report of the Road Committee and awarding the contract to the union tenderer.

GOOD DRAUGHTSMEN SCARCE.

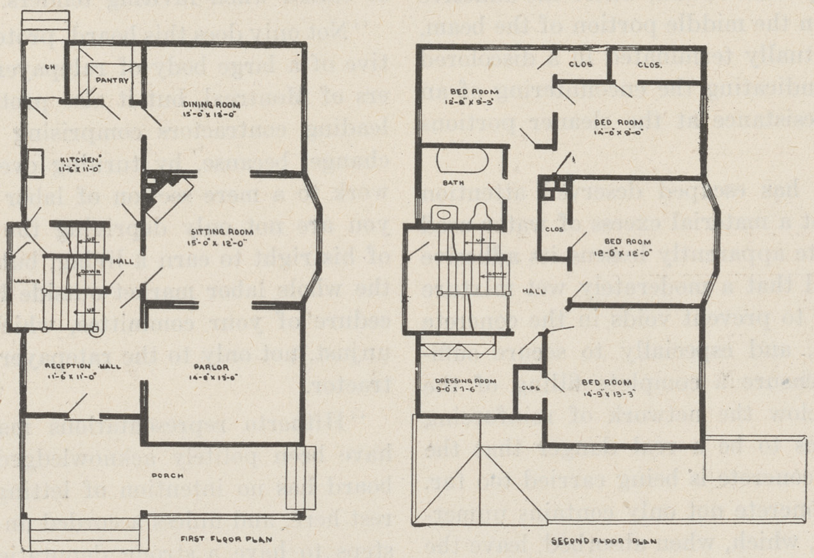
Toronto architects complain of the difficulty experienced in trying to procure competent draughtsmen. Even where they are prepared to pay the highest salaries, it seems impossible to secure good men. Trial has been made of some English draughtsmen who come to Canada with highest recommendations from leading London firms, but their services have not proved satisfactory, partly on account of the difference between Canadian and British methods.

DESCRIPTION OF DESIGN FOR MODERATE COST HOUSE.

Nine room frame house on a brick foundation. Main body of house is 27 feet 6 inches by 39 feet 8 inches. Has combination stairway and is heated by steam. Plain oak finish, with oak floors, are provided for first story, except in kitchen and pantry, where Georgia pine is used for finish, and maple for floors. Balance of finish is of Georgia pine, and floors of quarter-sawed Georgia pine. There is a large attic, with stairway extending to same. Estimate cost is $3,800.



DESIGN FOR MODERATE COST HOUSE.



PLANS OF DESIGN FOR MODERATE COST HOUSE.

BUILDING PAPER COMBINE.

In the Senate a few days ago Senator Gibson made the statement that a combine had been formed by Messrs. Jenkins & Hardy, of Toronto, for the purpose of securing control of the building paper and roofing output of Canada. They are said to have agents in all parts of the country, from whom retail dealers are compelled to buy, and, moreover, in order to obtain a ten per cent. rebate at the end of the year, must make a sworn declaration that they have bought from no one else.

Senator Gibson also read the following letter:—

"We beg to advise you that the association now consists of the undersigned, and that for the year 1907 the same quantities and premiums, subject to the same conditions as were in force for the year 1906, will apply. Kindly acknowledge receipt to Jenkins & Hardy, Toronto." The letter is signed by the following: The Carriette-Paterson Manufacturing Company, St. John and Halifax; St. Croix Paper Company, Halifax; Dominion Paper Company, Lockerley & McComb, A. McArthur & Company, Paterson Manufacturing Company; the J. C. Wilson Company, Montreal; W. I. Findlay & Company, Strathcona; Ford & Company, Portneuf; Hamilton Tar Distillery Company, Hamilton; Merrick, Anderson & Company, Winnipeg; Northumberland Paper & Electric Company, Toronto; Sault Ste. Marie Pulp & Paper Company, Sault Ste. Marie; Sandson Manufacturing Company, Sydney, N.S.

It was stated that the combine had obtained such control that they compelled consumers to pay 100 per cent. more for articles than they were worth. The combine provisions did not extend to print paper, but to the many varieties of building paper. A circular had been sent out raising the prices of building, roofing and all similar papers for this year. The price of carpet felt was raised $10 a ton. Building paper was raised from $2 to $2.25 a roll, an increase of 25 cents a roll.

Senator Gibson thought that it would be well if the Government would strike out the duties on building paper, as at present it was one of the most important commodities used by settlers in the West.

Hon. Mr. Scott pointed out that there was a provision in the criminal law against combinations in restraint of trade. It had been used recently and a conviction obtained on less evidence than Senator Gibson had given. It was, however, not the duty of the Federal Government, to enforce the criminal law. Any individual could take proceedings.

Senator Lougheed took exception to this opinion. He did not think the expense and trouble of bringing improper combines to time should be thrown on individuals.

Senator McMullen declared the Government should take immediate action against the combine Senator Gibson had revealed to the Senate. He thought the Government should have an agent in every Province to look out for combines and report upon them.

Sir Richard Cartwright said this was the first time the attention of the Government had been called to the building paper combine, and intimated that it would be looked into.

COMPETITION FOR STORE AND DWELLING.

Only one drawing was submitted in this competition, hence the prizes cannot be awarded. Apparently the subject is one that does not appeal to students as did the House Competition, although we fail to understand why this should be.

BOOK REVIEWS.

''Modern Practical Carpentry,'' by George Ellis, published by B. T. Batsford, 94 High Holborn, London, England. Price, 12s. 6d. The author of this work, who, by the way, is author of ''Modern Practical Joinery,'' has gone very much into detail in describing the best methods of doing all classes of ''practical'' carpentry. He is of the opinion that a sufficient number of books have been published treating the theoretical side of the question, and has therefore paid special attention to the practical side. The book is not written for trained carpenters alone, but can be thoroughly understood by the novice as well. The work is profusely illustrated and contains 375 pages.

The Ellis Marble Quarry, Tweed, Ont., which has been closed nearly all winter, has been reopened, and operations will be carried on steadily through the summer. It is being operated by the Roman Stone Company, of Toronto, who have some large contracts in hand. It is expected that the material will be shipped at the rate of a car load per day, which will necessitate the employment of from ten to fifteen men. The material is mixed with cement and used instead of cut stone in some of the larger and better class of buildings.

The Oneida Community, Limited, Niagara Falls, Ont., are manufacturing a chain for pipe hanging which consists of two parts. An adjustment screws solidly into the ceiling, on which is hung a strong chain which holds the pipe. This chain may be shortened or lengthened at will, thus allowing the pipe to be hung at any distance from the ceiling.

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WONDERFUL DEPOSIT OF B. C. MARBLE.

Recently we gave particulars of an immense find of fine marble near Chilliwack, B. C. In response to our enquiries, the owner, Mr. James Patterson, has written us as follows:

"The marble property was discovered and is owned by myself. The deposit is enorm ous, and is almost pure carbonate of lime. Mr. M. J. Hersey, of Montreal, gave analysis of 99 16-/000 pure lime. Both thin and thick beded is found. Almost any kind of marble known to the trade is represented in these immense ledges, of which there are three 1000 feet long and 300 feet high. A few feet from the surface the marble is free from checks or fractures, except a few wide distances from each other, which does not impair its value for taking out large blocks. I am about to commence to open out the thin beded and test it on the local market. This is an even colored dark blue variety and very hard, taking a high polish without the use of acids, being very valuable for monumental work. The location is at East Chilliwack, at the foot hills, in the midst of the finest agricultural section in the Fraser Valley. The recently surveyed R. R. line, known as the V. V. & E., is close to the property, besides tributaries of the Fraser river, making transportation by water convenient. However it will take some time to open up the quarry and make a start."

When this marble is placed on the market we expect to give a full description of same.

CANADIAN BUILDING OPERATIONS FOR 1906.

At the opening of the building season for 1907 a brief review of the operations for the preceding year may give some idea of the great proportions which this industry may be expected to assume during the coming summer. Compared with 1905, the buildings erected in 1906 showed a remarkable increase, both in numbers and value. While this satisfactory condition was general throughout Canada, the increase was most pronounced in the case of the larger cities and in the Northwest Provinces, where the influx of population and the progress of settlement and of industrial development were more marked than elsewhere.

During January and February, 1907, a special investigation was conducted by the Department of Labor, with a view to obtaining statistical information as to the nature and extent of building operations during 1906 in forty-one cities of the Dominion. It was ascertained that the total value of buildings erected in these cities was $58,140,294. Of this total the City of Toronto, Ont., contributed $13,160,398, being the locality in which building was most active in 1906. The City of Winnipeg, Man., stood second, with a total of $12,760,450; Montreal, Que., third, with $8,600,300, and Vancouver, B.C., fourth, with $4,233,910. The remaining cities in which the value of building during 1906 exceeded $500,000, were:—Port Arthur, Ont., $2,894,760; Hamilton, Ont., $2,124,815; Edmonton, Alta., $1,869,069; Ottawa, $1,728,975; Calgary, Alta., $1,482,984; London, Ont., $1,200,000; Fort William, Ont., $1,152,240; Moose Jaw, Sask., $843,221; Brandon, Man., $748,672; Victoria, B.C., $699,300; Halifax, N.S., $688,315; Peterborough, Ont., $615,000; and Belleville, Ont., $600,000.

Comparative returns relating to the value of buildings in 1906 and 1905 were obtained in the case of 26 of the largest cities. In these the total value of buildings erected in 1905 was $39,862,634, and in 1906 $53,316,898, showing an increase for the year of $13,454,264, or approximately 33.6 per cent. The only localities from which returns were received saying that the year was less active than in 1905 were St. Hyacinthe, Que.; Hull, Que.; Niagara Falls, Ont.; St. Thomas, Ont.; Chatham, Ont., and Windsor, Ont.

Statistics of the United States Geological Survey show that the production of common brick in that country for 1905 reached 9,817,355,000, or one billion more than in the preceding year. Pressed brick showed a gain of 27.84 per cent., with a total production of 541,790,000. Architectural terra cotta also shows a gain of 21.81 per cent. The figures for Canada, if available, would no doubt bear favorable comparison in proportion to population with those of the United States, as does the volume of our building operations.

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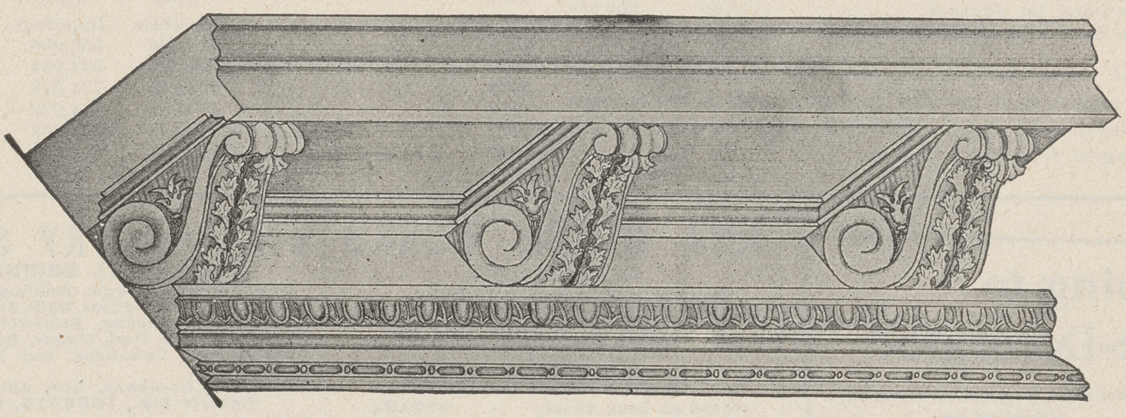

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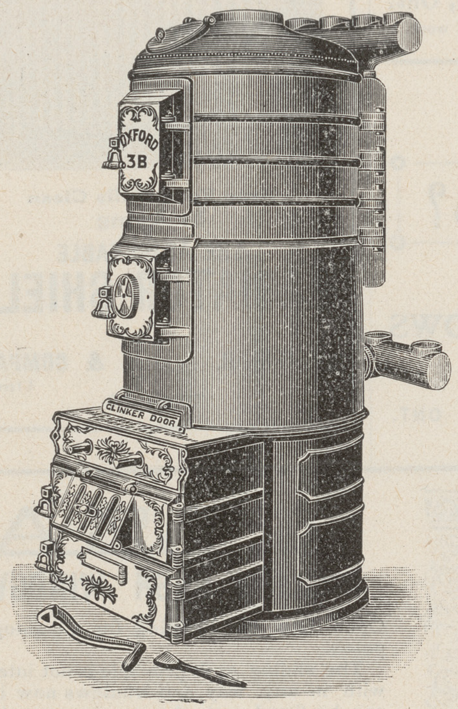

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CEMENT CONSUMPTION IN CANADA.

The total quantity of Portland cement manufactured in Canada in 1906 was 2,152,562 barrels, as compared with 1,541,568 barrels in 1905, an increase of 610,994 barrels, or 39.6 per cent. The total sales of Portland cement were 2,119,764 barrels, as compared with 1,346,548 barrels in 1905, an increase of 775,216 barrels, or 57.4 per cent.

Fifteen companies were operating plants during 1906, with a total daily capacity of about 10,500 barrels, namely, one in Nova Scotia, two in Quebec, eleven in Ontario, and one in British Columbia. At least four plants were under construction during the year, of which the total initial daily capacity will be about 4,700 barrels.

Detailed statistics of production in 1905 and 1906 are as follows:—

	1905. Bbls.	1906. Bbls.
Portland cement sold	1,346,548	2,119,764
Portland cement manufactured	1,541,568	2,152,562
Stock on hand 1st January	111,446	269,558
Stock on hand 31st December	306,466	302,356
Value of cement sold	$1,913,740	$3,164,807

Some companies do not take stock at the end of the calendar year, consequently their estimates of stock on hand do not always agree from year to year.

The average price per barrel at the works in 1906 was $1.49, as compared with $1.42 in 1905.

The imports of Portland cement into Canada in 1906 were:—

Six months ending June	945,187	$319,021
Six months ending December	1,485,573	459,685
The year 1906	2,430,760	$778,706

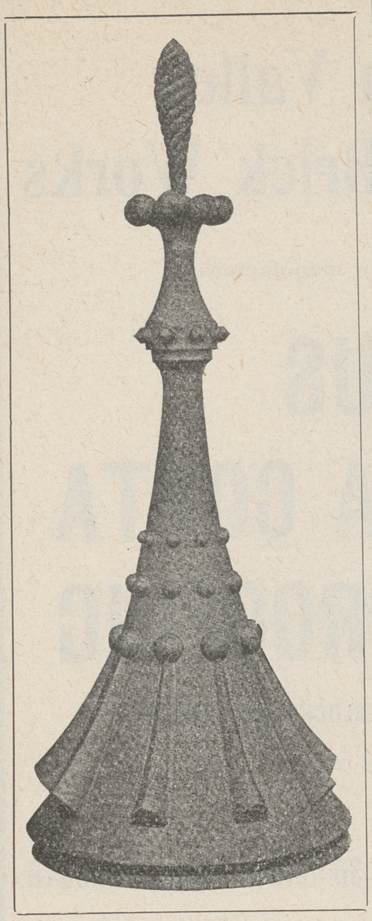
This is equivalent to 694,505 barrels of 360 pounds each at an average price per barrel of $1.12. The duty is 12 1-2 cents per hundred pounds.

The imports in 1905 were equivalent to 917,558 barrels, valued at $1,138,548, or an average price per barrel of $1.24.

There is very little cement exported from Canada. The consumption is therefore practically represented by the Canadian sales, together with the imports.

The following is an estimate of the consumption of Portland cement in Canada for the past six years:—

Year.	Bbls. Canadian.	Bbls. Imported.	Bbls. Total.
1901	317,066	555,900	872,966
1902	594,594	544,954	1,139,548
1903	627,741	773,678	1,401,419
1904	910,358	784,630	1,694,988
1905	1,346,548	917,558	2,264,106
1906	2,119,764	694,503	2,814,267



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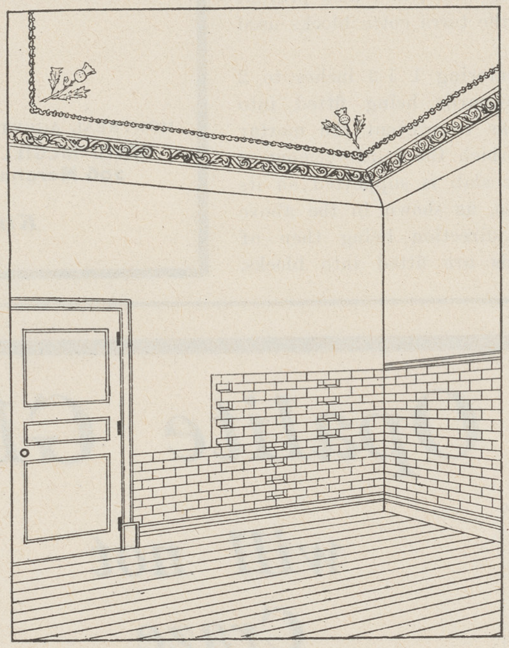

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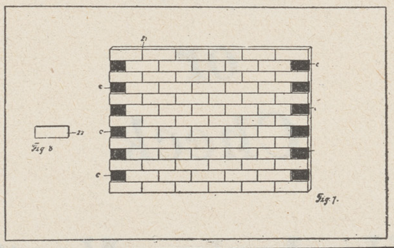

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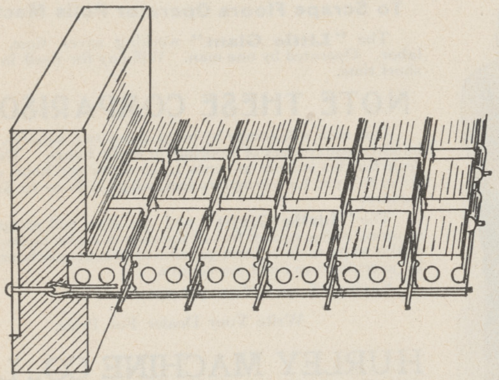

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The blocks are laid out on a centering 1 1-2 inches to 2 inches apart, tubular elastic pasteboards being fitted into aligning channels of adjacent blocks to prevent the mortar from running into channels, after which the reinforcement is laid between the blocks. When the slab is supported on its four edges it is reinforced crosswise, as shown in the above sketch, the reinforcement of one direction being then of necessity laid in before pasteboards are fitted into blocks.

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